NEW SPECIES OF TOXIC *TEDANIA* FROM NORTHERN VANUATU (PORIFERA: DEMOSPONGIAE: POECILOSCLERIDA: TEDANIIDAE)

JOHN A. KENNEDY AND JOHN N.A. HOOPER

Kennedy, J.A. & Hooper, J.N.A. 2000 06 30: New species of toxic *Tedania* from Northern Vanuatu (Porifera: Demospongiae: Poecilosclerida: Tedaniidae). *Memoirs of the Queensland Museum* **45**(2): 445-451. Brisbane. ISSN 0079-8835.

Tedania (Tedania) strongylostyla sp. nov. is described, compared with *T. ignis*, another toxic species from the Caribbean, and other *Tedania* species from tropical and subtropical Pacific waters. ❒ *Porifera, Demospongiae, Poecilosclerida, Tedaniidae, Tedania, new species, Vanuatu, West Pacific, taxonomy, dermatitis, toxic sponge.*

John A. Kennedy & John N.A. Hooper, Marine Biology Laboratory, Queensland Museum, South Brisbane 4101, Australia; 13 August, 1999.

Toxic reactions from handling marine sponges are well documented for species of *Neofibularia*, *Biemna*, *Lissodendoryx*, *Tedania*, and also recorded from some species of *Microciona* and *Haliclona* (see Wilkinson, 1978; Hooper, Capon & Hodder, 1991; Hooper, 1996; Rifkin, 1996). Of these toxic species, the most notorious is *Tedania ignis* (Duchassaing & Michelotti, 1864) from the Caribbean, earning it the name of 'fire sponges' (de Laubenfels, 1949). De Laubenfels (1949; 1954) reported that *T. ignis* was abundant in shallow-waters throughout the West Indies and compared its dermatitis effects to those of poison-ivy (*Rhus toxicodendron*), producing a 'somewhat painful, itching, burning feeling lasting for several days' (1949: 17).

Tedania ignis was described subsequently from Hawaii and Palau by de Laubenfels (1950, 1954), with some hesitation. Their identification of these Pacific specimens was influenced by its similarity of dermatitis reaction to that of *T. ignis*. Identification was provisional, and after considering their geographic isolation, de Laubenfels suggested that they should be recognised as *T. ignis* subspecies *pacifica*.

With the possible exception of a casual observation by Bergquist (reported in Southcott & Coulter, 1971), such dermatitis reactions have not been reported from any other species of *Tedania*. Bergquist informed Southcott & Coulter (1971) that she had received skin irritations from handling *Tedania* in New Zealand waters, but her observation was not accompanied by identification or description of the offending species.

Recent collection of a red sponge from Vanuatu produced a skin irritation similar to that described for *T. ignis*. Subsequent taxonomic identification confirmed it was a *Tedania*, differing from its congeners in spiculation and skeletal structure. This paper describes the material as a new species, detailing differences between it and similar species from tropical and subtropical waters.

MATERIALS AND METHODS

Specimens were collected from the intertidal zone, preserved initially in 95% ethanol for four days, then transferred to 70% ethanol for permanent storage. Histological techniques for light and scanning electron microscopy (SEM) follow Hooper (1996). Spicule morphometric analysis was conducted using a light microscope and camera-lucida, with reference to a template drawn from a stage micrometer. Spicule measurements are based on 25 spicules of each spicule category for each individual, and pertain to maximum dimension, denoted as range (and mean) of length and width. Spicule measurements are in micrometres.

Abbreviations: ORSTOM, Institut Français de Recherche Scientifique pour le Développement en Coopération, Centre de Noumea; QM, Queensland Museum, Brisbane; ZMA, Zoölogische Museum, Universiteit van Amsterdam, Amsterdam.

SYSTEMATICS

PORIFERA Grant
DEMOSPONGIAE Sollas
POECILOSCLERIDA Topsent, 1928

TEDANIIDAE Ridley & Dendy, 1886

DEFINITION. Encrusting, massive or digitate sponges; choanosomal skeleton predominantly plumoreticulate or even plumose, composed of tracts of smooth or spined styles, or smooth oxeas, enclosed within light or moderate spongin fibres, or with no visible fibres and spicules

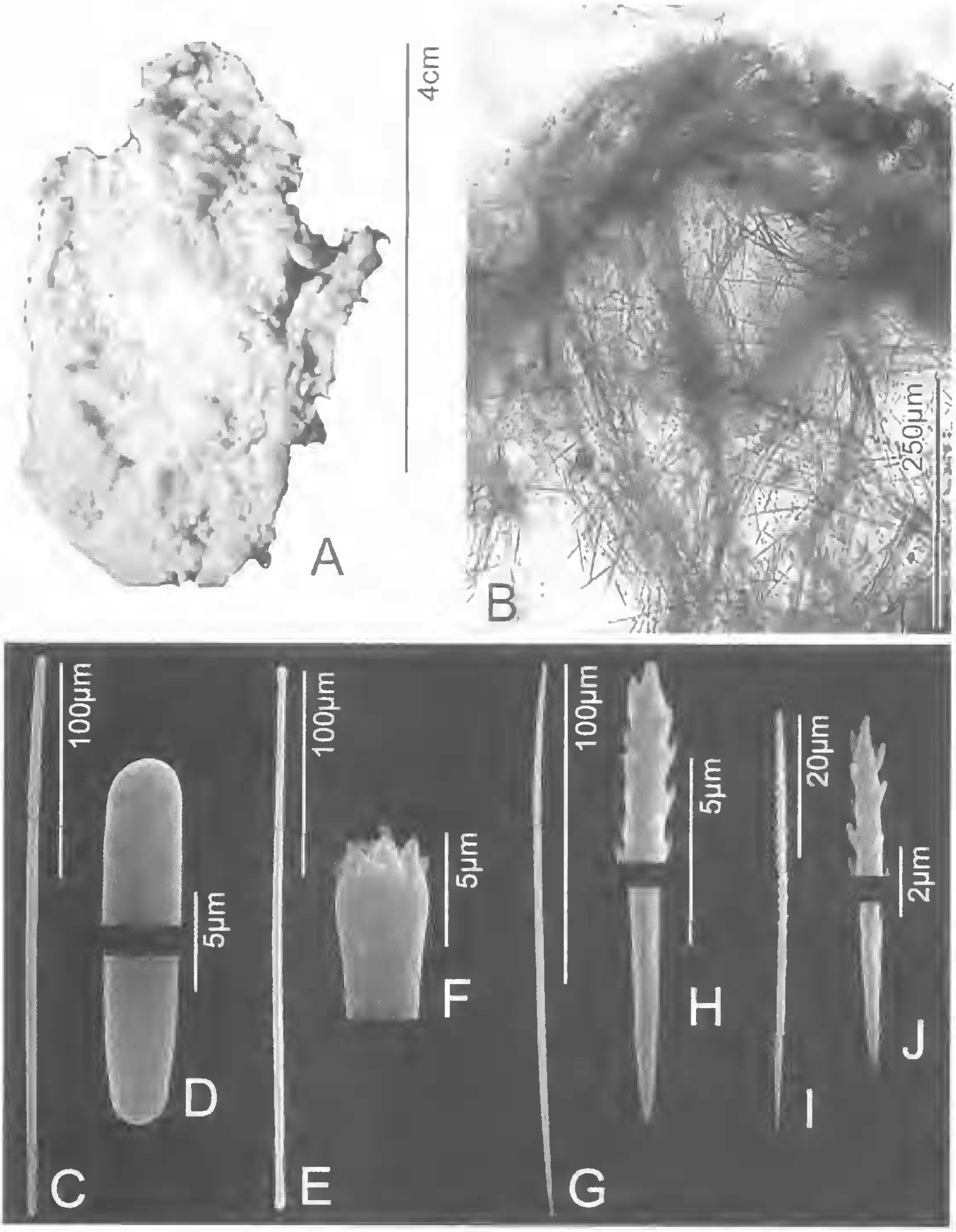

FIG. 1. *Tedania (Tedania) strongylostyla* sp. nov. (holotype QM G315594). A, Holotype. B, section through peripheral skeleton. C, strongylote style and D, terminations. E, tylote and F microspined base. G, larger onychaete and H, asymmetrical terminations. I, smaller onychaete and J, asymmetrical terminations.

merely cemented together with collagen at their nodes; ectosomal spicules are tylotes or tornotes, usually with basal spination, lying tangentially, paratangentially or erect on the surface, although usually not in bundles; microscleres are onychaetes; chelae absent (from Hooper & Wiedenmayer, 1994).

REMARKS. Discussions surrounding the family are well summarised in Hooper & Wiedenmayer (1994).

Tedania Gray, 1967

Tedania Gray, 1867: 520.
Trachytedania Ridley, 1881: 122 (type species *Trachytedania spinata* Ridley, 1881, by original designation).
Tedaniopsis Dendy, 1924: 366 (type species *Tedaniopsis turbinata* Dendy, 1924, by original designation).
Paratedania Burton, 1929: 441 (type species *Oceanapia tantula* Kirkpatrick, 1907, by original designation).
Oxytedania Sarà, 1978: 61 (type species *Oxytedania bifaria* Sarà, 1978, by original designation).

TYPE SPECIES. *Reniera digitata* Schmidt, 1862, by subsequent designation (see Koltun, 1959: 154).

DEFINITION. Massive; ectosomal skeleton composed of tylotes or tornotes with microspined bases forming tangential or paratangential surface tracts; choanosomal skeleton composed of styles with smooth or microspined bases, producing reticulate, plumo-reticulate, plumose or even dendritic architecture; microscleres are onychaetes (from Hooper, 1998).

REMARKS. The synonymy of *Tedania* follows Burton (1932), with the addition of *Oxytedania* Sarà, 1978 proposed by Desqueyroux- Faùndez & van Soest (1996) on the basis that the genus was unrecognisable, conditionally qualifying it as a junior synonym. Desqueyroux-Faùndez & van Soest (1996) further propose retaining *Tedania*, *Tedaniopsis* and *Trachytedania* as subgenera.

Subgenus **Tedania** Gray, 1867

DEFINITION. *Tedania* possessing smooth, relatively small, occasionally strongylote styles as structural megascleres, and microspined tylotes as ectosomal megascleres (from Desqueyroux-Faùndez & van Soest, 1996).

REMARKS. *Tedania* differs primarily from *Tedaniopsis* and *Trachytedania* in having tylote (rather than tornote) ectosomal megascleres.

Tedania (Tedania) strongylostyla sp. nov.
(Fig. 1, Table 1)

ETYMOLOGY. *Strongylostyla*, for the strongylote-like ends of the styles which differentiate this species from its congeners.

MATERIAL. HOLOTYPE: QM G315594: inlet leading to Yeu Métcnia Bay (Picot Bay), Hiu (North Island), Torres Islands, Vanuatu, 13°05.340'S,166°33.061'E, inlet with rocky coralline substrate and moderately turbid water (about 20cm visibility), 0.3m depth, 22.vii.1999, coll. J.A. Kennedy.

COMPARATIVE MATERIAL. PARALECTOTYPE: ZMA POR.2373 *Thalysias ignis* Duchassaing & Michelotti, 1864 from St Thomas, Caribbean..

HABITAT DISTRIBUTION. Marine, less than 1m depth, on rocky coralline substrate and partially buried in surrounding sand, occurring in moderately turbid water; Torres Islands, Vanuatu.

DESCRIPTION. *Shape*. Thickly encrusting, amorphous mats, up to 16cm in greatest horizontal width and 2cm thick; loosely adhering to rocky coralline substrate and partially buried in sand, with surface barely protruding through substrate.

Colour. Bright orange-red externally (Munsell 10R 6/12), drab greenish-grey in the peripheral Choanosome (2.5GY 6/2), becoming lighter brownish-grey in deeper regions (2.5Y 7/2) when alive; ethanol preserved material has drab milky-orange exterior, grading toward beige deeper in the choanosome.

Oscules. Small, approximately 1mm diameter when alive, scattered indiscriminately over the surface, commonly apical on short conulose projections up to 4mm high and 8mm diameter, but also flush with surface; less obvious in preserved state.

Texture. Soft, spongy, compressible, easily torn.

Surface characteristics. Opaque, with approximately two-thirds of surface covered by sandy silt and fine algal filaments which extend into choanosome; lightly rugose, covered with small irregular ribs, lightly membranous over irregularly scattered, minute, subdermal depressions commonly about 1mm but up to 2mm wide.

Ectosome. Difficult to detach from choanosome; about 60-100μm thick; consisting of a tangential to paratangential layer of loose paucispicular — multispicular tracts of tylotes in whispy, dendritic-plumose arrangement, with abundant single tylotes and scattered onychaetes between

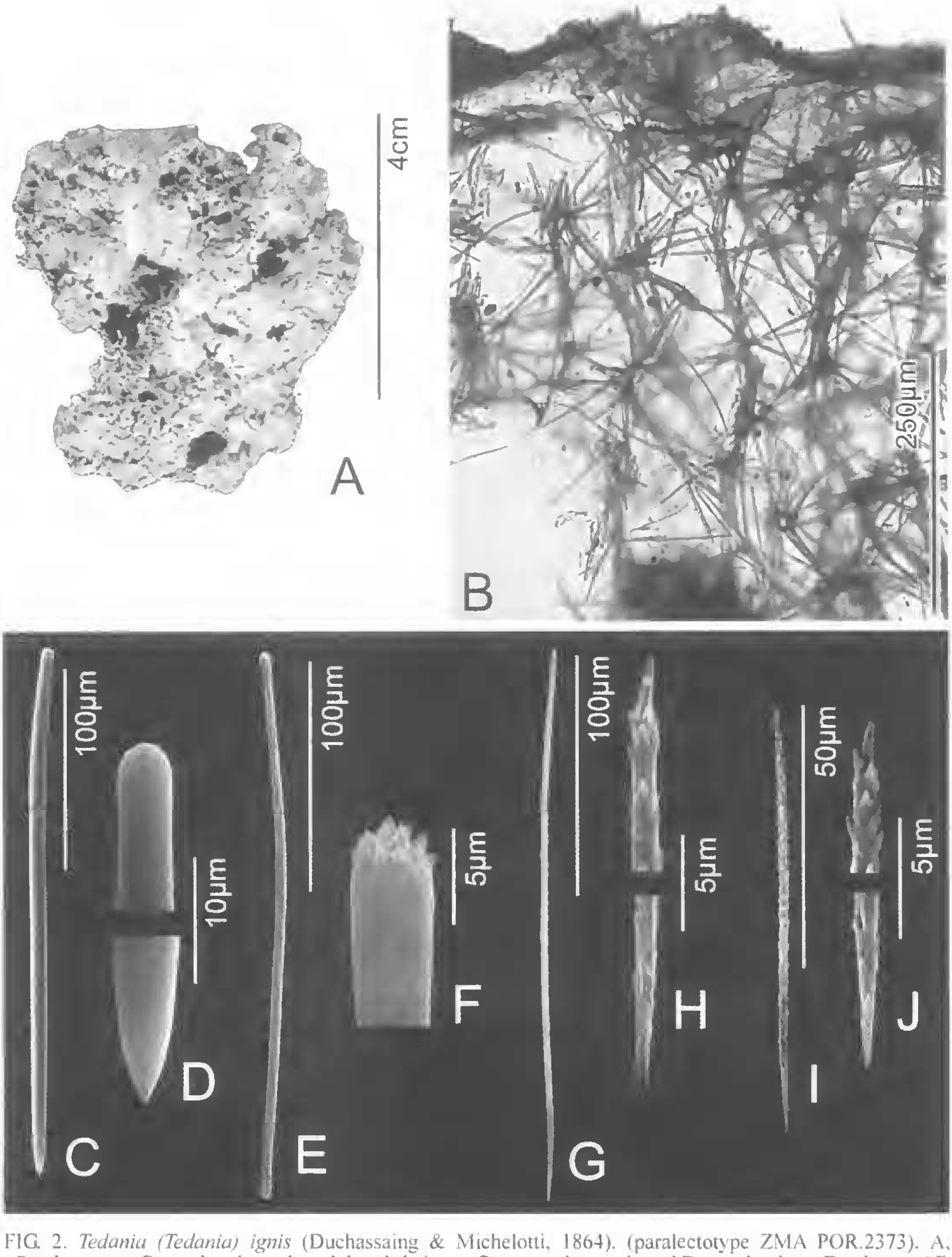

FIG. 2. *Tedania (Tedania) ignis* (Duchassaing & Michelotti, 1864). (paralectotype ZMA POR.2373). A, Paralectotype. B, section through peripheral skeleton. C, strongylote style and D, terminations. E, tylote and F, microspined base. G, larger onychaete and H, asymmetrical terminations. I, smaller onychaete and J, asymmetrical terminations.

tracts; ectosomal membrane appears very granular and contains fine detritus fragments.

Choanosome. Skeleton consists primarily of a vaguely ascending plumo-reticulate arrangement of paucispicular tracts composed mainly of strongylote styles and fewer tornotes, with abundant megascleres and microscleres scattered individually between tracts; mesohyl is granular, containing both fine and larger detritus fragments scattered throughout; fibres absent; bright orange-red larvae, about 500μm diameter, common in deeper choanosome.

Megascleres. Strongylote styles, thin, smooth, straight or very fiently curved, not tapering along entire length; with strongylote terminations that are lightly telescoped (210-(235)-304 × 2.5-(3.5)-5). Tylotes, smooth, straight, with oval, microspined apices (213-(228)-240 × 2-(3.5)-5).

Microscleres. Onychaetes, in two size classes, with abundant spination. Both larger (118-(185)-220 × 1-(1.2)-1.5) and smaller onychaetes (43-(55)-103 × 0.5-(0.7)-1) are asymmetrical/styloid due to microspination located one end.

REMARKS. *Tedania strongylostyla* sp. nov. is superficially similar to the Caribbean *T. ignis* (Duchassaing & Michelotti, 1864) in growth form, spicule dimensions (Table 1) and in producing a dermatitis reaction upon contact with skin. This similarity in their spicule dimensions is not surprising, since Lehnert & van Soest (1996: 69) state, '*Tedania (Tedania)* from tropical localities all over the world display similar spiculation, so that may not be a good species criterion'. Irrespective of these similarities, *T. strongylostyla* sp. nov. differs from *T. ignis* in having distinctly different style terminations and skeletal architecture.

Tedania ignis was redescribed comprehensively by van Soest (1984). It has an irregular renieroid choanosomal skeletal reticulation, whereas *Tedania strongylostyla* sp. nov. has a loose, vaguely ascending, plumo-reticulate choanosomal skeletal arrangement. Similarly, *T. strongylostyla* sp. nov. has distinctly strongylote styles compared with the unmodified styles of *T. ignis* (SEM examination of the paralectotype's spiculation is presented in Fig. 2 for comparison). Apart from the single record of strongylote modifications of styles observed in a single Jamaican deep-water specimen tentatively assigned to *T. (T.)* cf. *ignis* by Lehnert & van Soest (1996), differences in skeletal arrangement, spicule morphology and disjunct biogeographical distributions support the recognition of *T. strongylostyla* sp. nov. as distinct from *T. ignis*.

Other species of *Tedania* from the tropical Pacific with two size classes of onychaetes include *T. dirhaphis* Hentschel, 1912, *T. galapagensis* Desqueyroux-Faúndez & van Soest, 1996 and *T. strongyla* Jinhe, 1986. The first two species differ significantly from *T. strongylostyla* sp. nov. in having styles of typical morphology and mesh-type choanosomal skeletal structure. *Tedania strongyla* Jinhe, 1986, described from Chinese waters (Jinhe, 1986) is similar to *T. strongylostyla* sp. nov. in its skeletal arrangement and in possessing choanosomal strongyles, but as observed for *T. ignis* these spicules clearly represent malformed styles and do not constitute the principal choanosomal spicule type. *Tedania brasiliensis* Mothes et al., 2000 from Brazil also has two size classes of onychaetes but differs from *T. strongylostyla* sp. nov. in having a subisodictyal choanosomal skeletal arrangement similar to that of *T. ignis*.

It is possible that other species of *Tedania* may also have two size classes of onychaetes, even though they were originally recorded as having only one. For example, a second category of onychaete was discovered by van Soest (1984) in *T. ignis*, and in several *Tedania (Trachytedania)* spp. by Desqueyroux-Faúndez & van Soest (1996).

The dermatitis reaction experienced by the primary author through contact with *T. strongylostyla* sp. nov. commenced as a mild itching sensation lasting for about five minutes, intensifying to severe itching, mild swelling and reddening of the skin lasting for three days, with subsequent skin loss experienced after one week. The extent of the reaction varied between collectors, ranging from only mild itching to more severe reactions as described above. Experimental application of an alcohol preserved specimen failed to produce any irritation.

ACKNOWLEDGEMENTS

The authors thank ORSTOM for the opportunity to participate in the northern Vanuatu biodiversity survey program conducted during July, 1999; the captain, crew and scientists of 'N/O Alis' for their assistance in the field; Dr Rob van Soest, Zoölogische Museum, Universiteit van Amsterdam, for loan of type material; and Dr Eduardo Hajdu, Universidade Federal do Rio de Janeiro and Universidade de São Paulo, for bringing to our attention new literature.

TABLE 1. Comparison between spicule dimensions of *Tedania (T.) strongylostyla*, *T. (T.) strongyla*, *T. (T.) ignis*, *T. (T.) brasiliensis*, *T. dirhaphis* and *T. (T.) galapagensis*. Measurements given in μm, denoted as range (and mean). L=length; W=width.

Species	Locality	Styles	Tylotes	Large onychaetes	Small onychaetes
T. strongylostyla sp. nov.	Northern Vanuatu, W. Pacific Ocean	Strongylote styles L. 210-(235)-304; W. 2.5-(3.5)-5	L. 213-(228)-240; W. 2-(3.5)-5	L. 118-(185)-220; W. 1-(1.2)-1.5	L. 43-(55)-103; W. 0.5-(0.7)-1
T. strongyla Jinhe, 1986	Gulf of Tonkin, South China Sea	Typical styles L. 190-310; W. 6-8. Strongylote styles L. 212-224; W. 6-8.	L. 201-218; W. 3-4	L. 126-182; W. 2-3	L. 50-62; W. 1
T. ignis (Duch. & Mich., 1864) (Paralectotype; van Soest, 1984)	Jamaica, Caribbean Sea	L. 220-240; W. 4-8	L. 210-225; W. 3	L. 180	L. 50
T. ignis (Duch. & Mich., 1864) (van Soest, 1984)	Caribbean Sea	L. 202-(248.8)-281; W. 4-(6.31)-9	L. 180-(217.1)-248; W. 2.5-(3.38)-4.5	L. 154-(211.1)-247; W. 0.5-(1.61)-2.5	L. 30-(64.0)-95; W. 0.5
T. cf. *ignis* (Duch. & Mich., 1864) (Lehnert & van Soest, 1996)	Jamaica, Caribbean Sea	L. 250-300; W. 9-11	L. 215-240; W. 3-4	L. 215-240; W. 3-5	L. 35-70; W. 1
T. ignis pacifica (Duch. & Mich., 1864) (de Laubenfels, 1954)	Hawaii, Central Pacific Ocean	L. 160-210; W. 6-8	L. 180-210; W. 3-4	L. up to at least 200; W. 1-2	
I. ignis pacifica (Duch. & Mich., 1864) (de Laubenfels, 1954)	Palau, W. Pacific Ocean	L. 225; W. 3.5	L. 245-260; W. 5-6	L. <215; W. <1	
T. brasiliensis Mothes et al., 2000	Chilean Coast, E. Pacific Ocean	Strongyles L. 151-228	L. 151-257	L. 95-200	L. 40-78
T. dirhaphis Hentschel, 1912	Arafura Sea	L. 218-312	L. 224-248	L. 200-312	L. 40-112
T. galapagensis Desqueyroux-Faúndez & van Soest, 1996	Galapagos, E. Pacific Ocean	L. 192-246; W. 6-7	L. 179-234; W. 3-4	L. 173-205; W. 2	L. 61-93; W. 0.5-1

LITERATURE CITED

BURTON, M. 1929. Porifera. Part 2. Antarctic sponges. British Antarctic ('Terra Nova') Expedition, 1910. Natural History Report, Zoology. 6(4): 393-458.

1932. Sponges. Discovery Reports 6: 237-392.

DENDY, A. 1924. Porifera. Part 1. Non-Antarctic sponges. British Antarctic ('Terra Nova') Expedition, 1910. Natural History Report 6(3): 269-392.

DUCHASSAING DE FONBRESSIN, P. & MICHELOTTI, G. 1864. Spongiaires de la mer Caraïbe. Hollandische Maatschappij Der Wetenschappen, Haarlem. Natuurkundige Verhandelingen (2) 21(3): 1-115.

DESQUEYROUX-FAÚNDEZ, R. & SOEST, R.W.M. van 1996. A review of Iophonidae, Myxillidae and Tedaniidae occurring in the South-East Pacific (Porifera: Poecilosclerida). Revue Suisse de Zoologie 103(1): 3-79.

GRAY, J.E. 1867. Notes on the arrangement of sponges, with the description of some new genera. Proceedings of the Zoological Society of London 1867: 492-558.

HENTSCHEL, E. 1912. Kiesel- und Hornschwämme der Aru und Kei-Inseln. Abhandlungen Senckenbergiana naturforschende Gesellschaft 1912: 295-448.

HOOPER, J.N.A. 1996. Revision of the Microcionidae (Porifera: Poecilosclerida: Demospongiae), with description of Australian species. Memoirs of the Queensland Museum 40: 1-626.

1998. Sponguide: Guide to sponge collection and identification. (Queensland Museum: Brisbane) (http://www.qm.qld.gov.au/nature/explorenature/spong.pdf).

HOOPER, J.N.A., CAPON, R.J. & HODDER, R.A. 1991. A new species of toxic marine sponge (Porifera: Demospongiae: Poecilosclerida) from Northwest Australia. The Beagle, Records of the Northern Territory Museum of Arts and Sciences 8(1): 27-36.

HOOPER, J.N.A. & WIEDENMAYER, F. 1994. Porifera. Pp. 1-624. In Wells, A. (ed.) Zoological Catalogue of Australia. Vol. 12. (CSIRO Australia: Melbourne).

JINHE, L. 1986. Sponges as marine fouling organisms in China waters I. Studia Marina Sinica 26(2): 76-116.

KIRKPATRICK, R. 1907. Preliminary report on the Monaxonida of the National Antarctic Expedition. Annals and Magazine of Natural History (7) 20: 271-291.

KOLTUN, V.M. 1959. The Cornacuspongida of the northern and far eastern seas of the U.S.S.R. Pp. 1-236. In Keys to the Fauna of the U.S.S.R. Published by the Zoological Institute Akademia Nauk SSSR Vol. 67 Moscow: Izdatel'stvo 'Nauka' (in Russian).

LAUBENFELS, M.W. de 1949. Sponges of the Western Bahamas. American Museum Novitates 1431: 1-25.

1950. The sponges of Kaneohe Bay, Oahu. Pacific Science 4(1): 3-36.

1954. The sponges of the west central Pacific. Oregon State Monographs, Zoology 7: 1-306.

LEHNERT, H. & SOEST, R.W.M. van 1996. North Jamaican Deep Fore-Reef Sponges. Beaufortia 46(4): 53-81.

MOTHES, B., HAJDU, E. & SOEST, R.W.M. van 2000. *Tedania brasiliensis* new species (Demospongiae, Poecilosclerida, Tedaniidae) from Brazil, with some remarks about the genus *Tedania* in the tropical southwestern Atlantic. Bulletin of Marine Science 66(1): 1-11.

MUNSELL, 1977. Munsell Color Charts for Plant Tissues. 2nd Edition (Munsell Colour: University of Wisconsin).

RIDLEY, S.O. 1881. XI. Spongida. Horny and siliceous sponges of Magellan Straits, S.W. Chili, and Atlantic off S.W. Brazil. Proceedings of the Zoological Society of London 1881: 107-137, 140-141.

RIDLEY, S.O. & DENDY, A. 1886. Preliminary report on the Monaxonida collected by the H.M.S. 'Challenger'. Annals and Magazine of Natural History (5) 18: 325-351, 470-493.

RIFKIN, J.F. 1996. Phylum Porifera (sponges). Pp. 340-344. In Williamson, J.A., Fenner, P.J., Burnett, J.W. & Rifkin, J.F. (eds) Venomous and Poisonous Marine Animals: Medical and Biological Handbook. (University of New South Wales Press: Sydney).

SARÀ, M. 1978. Demospongie diacque superficiali della Terra del Fuoco (Spedizioni AMF Mares-GRSTS e SAI). Bolletin dei Musei e degli Instituti Biologici dell 'Universita' di Genova 46: 7-117.

SCHMIDT, E.O. 1862. Die Spongien des Adriatischen Meeres. P. 1-88 (Leipzig: Engelmann).

SOEST, R.W.M. van 1984. Marine Sponges from Curaçao and other Caribbean Localities. Part III. Poecilosclerida. Studies on the Fauna of Curaçao and other Caribbean Islands (199): 1-167.

SOUTHCOTT, R.V. & COULTER, J.R. 1971. The effects of the southern Australian marine stinging sponges, *Neofibularia mordens* and *Lissodendoryx* sp. The Medical Journal of Australia 2: 895-901.

THIELE, J. 1905. Die Kiesel und Hornschwämme der Sammlung Plate. Fauna chilensis. Zoologische Jahrbücher, Jena Supplement 6: 407-496.

TOPSENT, E. 1928. Spongiaires de l'Atlantique et de la Méditerranée provenant des croisières du Prince Albert ler de Monaco. Résultats des Campagnes Scientifiques Accomplies sur son Yacht par Albert ler Prince Souverain de Monaco 74: 1-376.

WILKINSON, C.R. 1978. Description of two Demospongiae, one being toxic from the Great Barrier Reef. Tethys 8(3): 267-270.